DETECTION OF LIVER TUMOR BY USING DIGITAL IMAGE PROCESSING

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Abstract—The detection and diagnosis of liver neoplasm from CT pictures by victimization DIP, is a trendy technique depends on victimization laptop additionally to textural associate analysis to get an accurate liver identification, despite the strategies problem that came from liver position within the abdomen among the opposite organs. This technique can create the doc ready to sight the neoplasm easing treatment conjointly it facilitate physicians and radiologists to spot the the affected elements of the liver so as to shield the conventional elements the maximum amount as doable from exposure to radiation. This study describes a new 2nd liver segmentation technique for purpose of transplantation surgery as a treatment for liver tumors. Liver segmentation isn't solely the key method for volume computation however conjointly basic for any process to induce additional anatomy data for individual patient due to the last distinction, blurred edges, large variability in form & complicated context with muddle options close the liver that characterize the CT liver pictures. In this paper, the CT pictures square measure taken, & then the segmentation processes square measure applied to the liver image which is able to notice, extract the CT liver boundary & any classify liver diseases.

Index Terms — Computed Tomography (CT), Modified K-mean, Irregularity.

1 INTRODUCTION

According to late insights, liver malignancy is one of driving dangerous illnesses in Iraq. So far, the main complete test for liver growth is needle biopsy. Notwithstanding, the needle biopsy is an intrusive method and for the most part not recom-retouched unless there is a flat out need [1]. To stay away from unnecessary needle biopsy, specialists can exploit information gave by pictures gained from different therapeutic imaging frameworks, for example, surface composition, object limit ex-footing, tumor identification, and so on to help them to enhance their finding [2]. For this situation, a powerful picture investigation is important. Albeit numerous division strategies have been effectively utilized as a part of restorative imaging, it has found that a large portion of them for the most part don't perform well in sectioning the liver limit from a CT liver picture [3]. This is primarily because of the way that there are different organs contiguous and near the liver which makes division more troublesome. Likewise, the liver itself might likewise contain tumors, for example, hepatoma and haemangioma that can darken the limit [4]. Keeping in mind the end goal to address these issues, we introduce a programmed CT liver im-age order framework which can be utilized to identify four sorts of liver tumor: hepatoma, haemangio, pimple and cirrhosisister. The point of this work is to portion a tumor in a liver; this will make the specialist ready to see the tumor and after that will be simple for the treatment. In this study, the CT pictures are taken, and after that the segmentation procedures are connected to the liver picture which will discover, extricate the CT liver limit and further characterize liver diseases.

2. MASK CREATION

Mask Creation is used to create the binary mask which has the value of 0 or 1's. This operation is performed by Specify polygonal region of interest (ROI) in MATLAB software. This is used to draw around the edge of the liver manually, making it possible to discard all irrelevant information. Here we can see the result of our own enclosure of the liver: A binary image used as a mask. For masked filtering where the liver is giving the value 1 and the background is given the value 0, the final step involved applying the segmented mask in Figure (1) to the original image (Figure (1)).
multiplying the final eroded image with the original image to give the masked image. Colors play an important role for object detection, tracking and recognition, etc. The problem of RGB (Red, Green, and Blue) does not provide the correct information about liver color due to the problem of X-ray effects and the presence of other organs of similar density to the liver, so we converted the masked image to HSV color space.

3. PROPOSED ALGORITHM FOR CT CLASSIFICATION

The basic principle of the proposed algorithm is integrating the contour with K-means clustering.
1. Read the HSV image.
2. Apply the decorrelation stretching for color separation.
3. Convert original image from HSV color space type to L*a*b* color space.
4. Apply modified K-Means Clustering method which depends on the color and distance for each sub image of a*b* bands.
5. Depending on the result of clustering, label every pixel in the image.
6. Create new segmented images depending on color. 7. Depending on the label pixel separate objects in image by color.
8. Output the segmentation nuclei into a Separate Image. Then programmatically determine the index of the cluster containing the blue objects because K-means will not return the same cluster index value every time. We can do this using the cluster center value, which contains the mean 'a*' and 'b*' value for each cluster.

The traditional K-mean depends only on the distance between the centroid while the modified K-mean depends on both the distance and color. The result aims to developing an accurate and more reliable image which can be used to help the physicians for medical diagnosis which can be used in locating liver tumors, measure tissue volume and in more. The advantage of K-means algorithm is simple and quite efficient. It works well when clusters are not well separated from each other. The noise free image is given as input to the K-means and tumor is extracted from the CT image, then segmentation using thresholding of output in feature extraction. Finally, approximate reasoning for calculating tumor shape. The flowchart of histogram clustering and the k-means clustering Fig 2 shows the flowchart of histogram & k-means clustering.

4. IMAGE SEGMENTATION USING K-MEAN

We take four different cases for each of the Hepatoma, Hemanangioma, Cyst and Cirrhosis. We have implemented K-means clustering algorithm. Which is unsupervised clustering of images based on the color features. This process helps us to distinguish the normal liver tissue from the abnormal. Also it helps us to distinguish between different types of liver tumors such as
malignant tumor, benign tumor, Cyst and cirrhosis from the determination of the geometrical features for each class.

Figure (3) Shows the original image of haemangioma with normal and abnormal part.

5. AREA

Area of the segmented tumor is computed by counting, the number of pixels which have the value 1 in the image array. The area (A) in the object is just a count of the ones in the image array. For computing area, binary image is used [6].

\[
A = \sum \text{White pixels in the image}
\]

6 GEOMETRICAL FEATURE

Geometrical elements like zone, measurement, border, and ir-consistency file have been assessed from the isolated liver knobs. The quantity of pixels having the qualities (1) in the picture cluster which gives the territory of the divided tumor im-age. The worth (0) gives the foundation of the picture which is dark. Liver malignancy is described somewhat by the inconsistency in its tumor outskirt. For this investigation, the abnormalities in the tumor are registered by a list [7]:

\[
I = \frac{4\pi A}{P^2}
\]

Where, \( P \) is the edge of the tumor and \( A \) is zone of the tumor in pixels. The anomaly file is equivalent to 1 just for circle and it is < 1 for whatever other shape. We took the estimation of each of the zone and the edge of a tumor from the tables (1) to gauge the abnormality record. Table (1) spoke to the estimation of the Area and the Perimeter for the tumor. Table 1

Cyst has the most astounding esteem so it shapes is more consistency than alternate cases and more homogeneous in the composition than the others.

4. CONCLUSION

Tumour recognition utilizing CT picture has been done utilizing the digital image processing. We have built up a computerized strategy for the discovery of tumors in liver CT pictures utilizing mask, color map, color segmentation, modified K-Means punching and picture handling techniques. The division precision acquired utilizing the changed K-implicated clustering. Our framework has been effectively tried on an extensive number of tumor images, liver tumor executed for the segregation of the ordinary and obsessive tissues. The liver districts identified with a tumor can be precisely isolated from the liver image. This framework can be connected to identify tumor-like development much before they are obvious to human eye.

REFERENCES


